

Proposal of the suffix *-ota* to denote phyla. Addendum to 'Proposal to include the rank of phylum in the International Code of Nomenclature of Prokaryotes'

William B. Whitman,^{1,*} Aharon Oren,² Maria Chuvochina,³ Milton S. da Costa,⁴ George M. Garrity,⁵ Fred A. Rainey,⁶ Ramon Rossello-Mora,⁷ Bernhard Schink,⁸ Iain Sutcliffe,⁹ Martha E. Trujillo¹⁰ and Stefano Ventura¹¹

Abstract

As an addendum to the earlier proposal to include the rank of phylum in the International Code of Nomenclature of Prokaryotes (Oren *et al.*, *Int J Syst Evol Microbiol* 2015;65:4284–4287) we propose the suffix *-ota* to denote phyla, replacing the somewhat awkward *-aeota*. We therefore present a new draft modified version of Rule 8 of the International Code of Nomenclature of Prokaryotes and a corrected list of names of phyla to be considered for validation after approval of the proposal to include the rank of phylum in the Code.

The International Code of Nomenclature of Prokaryotes (ICNP) [1] covers the nomenclature of prokaryotes up to the rank of class only. As we felt that inclusion of the rank of phylum under the rules of the ICNP is long overdue, we earlier proposed changes in Rules 5b, 8, 15 and 22 [2]. The proposed new version of Rule 8 reads 'The name of a phylum is in the neuter gender, the plural number and written with an initial capital letter. The name is formed by the addition of the suffix *-aeota* to the stem of the name of one of the contained classes.'

Implementation of this Rule will lead to the formation of some awkward names that are difficult to pronounce, thus violating Recommendation 6.1 of the Code. Examples are *Alphaproteobacteraeota*, *Gemmatimonadaeota* (entries found in Table 1 in [2]). In addition, if the pending proposal to extend the Rules of the ICNP to include *Candidatus* taxa [3] is implemented, other awkward names such as *Nanoarchaeaeota*, *Korarchaeaeota*, and other similar *Candidatus* phyla of *Archaea* will be created.

We therefore recommend that the suffix to denote a phylum in Rule 8, '*-aeota*', should be changed to the simpler '*-ota*'. The use of this suffix to denote a phylum is comparable

with the use of the endings *-phycota* and *-mycota* for divisions or phyla of algae and fungi based on Article 16.3 of the International Code of Nomenclature for algae, fungi, and plants [4]. The emended version of Rule 8 is therefore proposed as follows:

RULE 8:

'The name of each taxon (covered by the Code) above the rank of order is a Latin or latinized word. The name of a class is in the neuter gender, the plural number and written with an initial capital letter. The name is formed by the addition of the suffix *-ia* to the stem of the name of the type genus of the type order of the class. The name of a subclass is in the feminine gender, the plural number and written with an initial capital letter. The name is formed by the addition of the suffix *-idae* to the stem of the name of the type genus of the type order of the subclass. The name of a phylum is in the neuter gender, the plural number and written with an initial capital letter. The name is formed by the addition of the suffix *-ota* to the stem of the name of one of the contained classes.'

Author affiliations: ¹Department of Microbiology, University of Georgia, Athens, GA 30602-2605, USA; ²Department of Plant and Environmental Sciences, The Institute of Life Sciences, The Hebrew University of Jerusalem, Edmond J. Safra Campus, Jerusalem 9190401, Israel; ³Australian Centre for Ergogenomics, School of Chemistry and Molecular Biosciences, The University of Queensland, St Lucia, Queensland, 4072, Australia; ⁴Microbiology Unit, BIOCANT Biotechnological Park, Cantanhede 3060-197, Portugal; ⁵Department of Microbiology & Molecular Genetics, Biomedical Physical Sciences, Michigan State University, East Lansing, MI 48824-4320, USA; ⁶Department of Biological Sciences, University of Alaska, Anchorage, AK 99508, USA; ⁷Department of Ecology and Marine Resources, Mediterranean Institute for Advanced Studies (IMEDEA UIB-CSIC), Esporles 07190, Spain; ⁸Department of Biology, University of Konstanz, Konstanz D-78457, Germany; ⁹Department of Applied Sciences, Northumbria University, Newcastle upon Tyne NE1 8ST, UK; ¹⁰Departamento de Microbiología y Genética, Campus Miguel de Unamuno, Universidad de Salamanca, Salamanca 37007, Spain; ¹¹National Research Council of Italy, Institute of Ecosystem Study, Sesto Fiorentino I-50019, Italy.

*Correspondence: William B. Whitman, whitman@uga.edu

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Table 1. Corrected list of names of phyla to be considered for validation after approval of the proposal to include the rank of phylum in the ICNP. This list is based on Table 1 in [2]

Proposed phylum name	Nomenclatural type (class)	Phylum name currently in common use	Comments
<i>Acidobacteriota</i>		<i>Acidobacteria</i>	<i>Acidobacteria</i> cannot be used as the name of the class as it is on the list of nomina rejicienda (Opinion 79). Instead we propose <i>Acidobacteriae</i>
<i>Actinobacteriota</i>	<i>Actinobacteria</i>	<i>Actinobacteria</i>	Note that no nomenclatural type has been designated for the class <i>Actinobacteria</i>
<i>Alphaproteobacteriota</i>	<i>Alphaproteobacteria</i>	<i>Proteobacteria</i>	As the name <i>Proteobacteria</i> is widely used for the phylum, the Judicial Commission may consider conserving this name (earlier used for a class) instead of <i>Alphaproteobacteriota</i>
<i>Aquificota</i>	<i>Aquificae</i>	<i>Aquificae</i>	
<i>Armatimonadota</i>		<i>Armatimonadetes</i>	We propose establishing the class <i>Armatimonadia</i> as the nomenclatural type
<i>Bacillota</i>	<i>Bacilli</i>	<i>Firmicutes</i>	As the name <i>Firmicutes</i> is widely used for the phylum, the Judicial Commission may consider conserving this name instead of <i>Bacillota</i>
<i>Bacteroidota</i>	<i>Bacteroidia</i>	<i>Bacteroidetes</i>	
<i>Caldisericata</i>	<i>Caldisericia</i>	<i>Caldiserica</i>	
<i>Chlamydiota</i>	<i>Chlamydiae</i>	<i>Chlamydiae</i>	
<i>Chlorobiota</i>		<i>Chlorobi</i>	<i>Chloroalba</i> cannot be used as the name of the class as it is on the list of nomina rejicienda (Opinion 79). Instead we propose <i>Chlorobia</i>
<i>Chloroflexota</i>	<i>Chloroflexia</i>	<i>Chloroflexi</i>	
<i>Chrysiogenetota</i>	<i>Chrysiogenetes</i>	<i>Chrysiogenetes</i>	
<i>Deferribacterota</i>	<i>Deferribacteres</i>	<i>Deferribacteres</i>	
<i>Deinococcota</i>	<i>Deinococci</i>	<i>Deinococcus-Thermus</i>	
<i>Dictyoglomota</i>	<i>Dictyoglomia</i>	<i>Dictyoglomi</i>	
<i>Elusimicrobiota</i>	<i>Elusimicrobia</i>	<i>Elusimicrobia</i>	
<i>Fibrobacterota</i>	<i>Fibrobacteria</i>	<i>Fibrobacteres</i>	
<i>Fusobacteriota</i>	<i>Fusobacteriia</i>	<i>Fusobacteria</i>	
<i>Gemmatimonadota</i>	<i>Gemmatimonadetes</i>	<i>Gemmatimonadetes</i>	
<i>Ignavibacteriota</i>	<i>Ignavibacteria</i>	<i>Ignavibacteriae</i>	
<i>Lentisphaerota</i>	<i>Lentisphaeria</i>	<i>Lentisphaerae</i>	
<i>Methanobacteriota</i>	<i>Methanobacteria</i>	<i>Euryarchaeota</i>	As the name <i>Euryarchaeota</i> is widely used for the phylum, the Judicial Commission may consider conserving this name instead of <i>Methanobacteriota</i>
<i>Mollicutota</i>	<i>Mollicutes</i>	<i>Tenericutes</i>	Note that no nomenclatural type has been designated for the class <i>Mollicutes</i>
<i>Nitrososphaerota</i>	<i>Nitrososphaeria</i>	<i>Thaumarchaeota</i>	As the name <i>Thaumarchaeota</i> is widely used for the phylum, the Judicial Commission may consider conserving this name instead of <i>Nitrososphaerota</i>
<i>Nitrospirota</i>		<i>Nitrospira</i>	We propose establishing the class <i>Nitrospiria</i> as the nomenclatural type
<i>Planctomycetota</i>		<i>Planctomycetes</i>	<i>Planctomycea</i> cannot be used as the name of the class as it is on the list of nomina rejicienda (Opinion 79). Instead we propose <i>Planctomycetes</i>
<i>Spirochaetota</i>		<i>Spirochaetes</i>	<i>Spirochaetes</i> cannot be used as the name of the class as it is on the list of nomina rejicienda (Opinion 79). Instead we propose <i>Spirochaetia</i>
<i>Synergistota</i>	<i>Synergistia</i>	<i>Synergistetes</i>	
<i>Thermodesulfobacteriota</i>	<i>Thermodesulfobacteria</i>	<i>Thermodesulfobacteria</i>	
<i>Thermomicrobiota</i>	<i>Thermomicrobia</i>	<i>Thermomicrobia</i>	
<i>Thermoproteota</i>		<i>Crenarchaeota</i>	<i>Thermoprotei</i> cannot be used as the name of the class as it is on the list of nomina rejicienda (Opinion 79). Instead we propose <i>Thermoprotea</i> . As the name <i>Crenarchaeota</i> is widely used for the phylum, the Judicial Commission may consider conserving this name instead of <i>Thermoproteota</i>
<i>Thermotogota</i>	<i>Thermotogae</i>	<i>Thermotogae</i>	
<i>Verrucomicrobiota</i>	<i>Verrucomicrobiae</i>	<i>Verrucomicrobia</i>	

We request that this change be considered by the Judicial Commission and by the International Committee on Systematics of Prokaryotes alongside the earlier proposal to include the rank of phylum in the Code [2].

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Conflicts of interest

The authors declare that there are no conflicts of interest.

References

1. Parker CT, Tindall BJ, Garrity GM. International Code of Nomenclature of Prokaryotes. Prokaryotic Code (2008 Revision). *Int J Syst Evol Microbiol* 2016. doi: 10.1099/ijsem.0.000778.
2. Oren A, da Costa MS, Garrity GM, Rainey FA, Rosselló-Móra R *et al.* Proposal to include the rank of phylum in the International

Code of Nomenclature of Prokaryotes. *Int J Syst Evol Microbiol* 2015;65:4284–4287.

3. **Whitman WB.** Modest proposals to expand the type material for naming of prokaryotes. *Int J Syst Evol Microbiol* 2016;66:2108–2112.
4. **McNeill J, Barrie FR, Buck WR, Demoulin V, Greuter W et al.** *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) Adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011.* Regnum Vegetabile 154. Koenigstein: Koeltz Scientific Books; 2012.